



Verticillium Wilt of Stone Fruit Trees and Its Prevention

K. G. PARKER



In its third year after planting, this J. H. Hale peach tree is developing *Verticillium* wilt symptoms. At present, symptoms are limited to browning and curling of the leaves on the lowest twig in middle part of tree, and in the upper part toward the right side.

COVER ILLUSTRATION shows an infected peach twig that is severely defoliated. All remaining leaves are wilted or brown.

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Verticillium wilt is a fungus disease that can be severe on cherry, peach, and plum trees. In New York State the disease has been found in scattered cherry and peach orchards, but has not been identified on plums. As many as one-third of the trees in an orchard may be affected. Incidence in individual orchards varies, however, and sometimes only a few trees are infected.

Under New York State conditions, serious infections of Verticillium wilt usually can be prevented if adequate precautions are taken in preparation for planting the trees.

SYMPTOMS

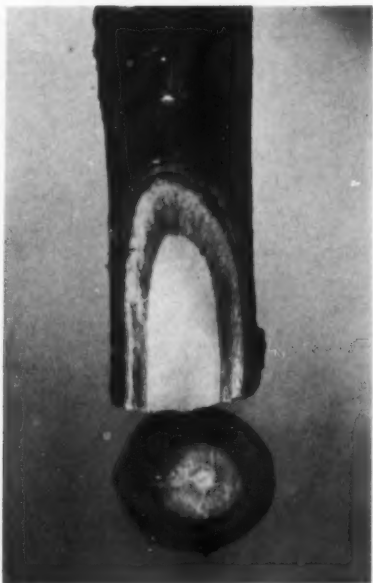
True wilt (the flagging of leaves) often is the first symptom on trees affected with Verticillium wilt. Wilting usually begins during the middle of the summer or later. It may be followed by yellowing or by browning and curling of the leaves, and then by defoliation. Sometimes, however, true wilt does not occur, and the leaves turn yellow or brown and drop.

Symptoms usually develop at the lower part of the shoots first, then progress upward. A few green leaves at the tips of the shoots may persist throughout the summer. By the second year, however, the shoots may become dry and die back from the tip. Death of twigs may be caused in part by winter injury which adds to the damage of the disease. Also in the second year, terminal growth is likely to be short and lateral shoots poor or nonexistent.

Brownish or grayish-brown streaks occur in the sapwood of affected trees, especially in the lower part of the tree and in larger branches. Sometimes such streaks are found in the wilted shoots of the current season, but discolored wood is not always evident in diseased new shoots.

It is not always easy to determine whether the trees are affected by Verticillium wilt or by winter injury. Discoloration in the wood caused by winter injury is usually darker than that caused by Verticillium wilt, it is more nearly solid than streaked, and the bark outside the discolored wood usually is dead. Furthermore, winter injury is more likely to be localized in the crotches of the branches. The problem of identifying Verticillium wilt is made especially difficult after the first year because winter injury commonly follows the wilt disease development, and the symptoms of the two disorders occur together.

RIGHT: Two-year-old peach twig cut to show brown discoloration of the Verticillium disease in the current season's wood tissue.



BELOW: This Montmorency sour cherry tree, in its fourth or fifth year after planting, shows severe symptoms in middle and left parts. The leaves are wilted, and have turned yellow or brown.



CAUSE OF DISEASE AND SOURCE OF INOCULUM

Verticillium wilt is caused by a fungus that invades the sapwood of the tree. This fungus is common in our soils where it can survive for two to three years without growing on a susceptible crop. It must build up on susceptible vegetable or berry crops or on weeds, however, before the amount of inoculum is sufficiently great for infection to occur on trees. For this reason tomatoes, peppers, eggplants, strawberries, and raspberries should not be grown in fields where trees are to be planted. The more common susceptible weeds in New York State are lamb's quarters, amaranth (pigweed), nightshade (horse nettle), and ground cherry.

The fungus gains entrance into the tree through injured places on the roots. Injuries may occur when roots are pruned at planting, or during later cultivation.

NATURE AND SEVERITY OF DAMAGE

Infection of Verticillium wilt usually occurs during the first ten years after trees are planted in the orchard. Symptoms are likely to develop in the second year, and to continue on the same or on different trees for several years longer. If infection on the individual tree occurs and symptoms develop during the first two or three years, a major part of the affected tree may die. Although an entire tree is rarely killed by this disease, it is common for larger branches to be killed. In such cases so much of the tree is lost that it is misshapen and should be destroyed. On the other hand, trees may recover and never show symptoms again; or they may recover temporarily and the symptoms will return a few years later.

CONTROL

Rotation and sanitation

The most effective control measure is the protection of each planting or orchard. The first step is to avoid planting susceptible crops, which have already been named, either before or after the trees are planted. There may be no symptoms on the susceptible crops, but they always should be suspected of being diseased and treated as though they were.

A second step is to keep susceptible weeds, named above, under full control. After the orchard is planted, thorough cultivation in the early part of the season and a cover crop of grass, or grass plus legumes, should control weeds. Weed sprays also should be helpful. The important point is to keep down weed growth throughout the year by whatever means is preferred. The common practice of cultivating early, and allowing weeds to grow late in the season, is not good from the standpoint of Verticillium wilt control.



This Montmorency cherry tree, approximately eight years old, has been infected for two or more years. Severe defoliation has occurred on left side only.

Should it be necessary to plant an orchard on a field where one of the susceptible crops has been grown, it would be helpful to wait two to four years before planting the trees and to grow grasses or grass and legumes on the field during this period. In such cases, if plans are known in time, it would be helpful to carry away the plant debris from the susceptible crop rather than to plow it under. This, of course, is not considered good practice from the standpoint of maintaining the organic matter in the soil, but in the case of *Verticillium* wilt the disease considerations are more important.

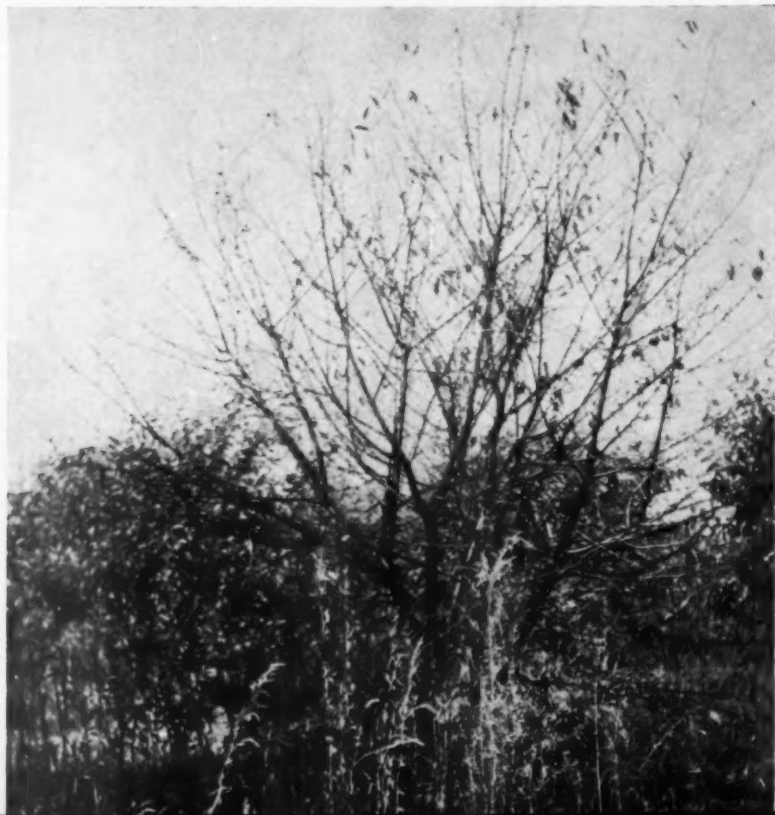
The organic matter content of the soil should be kept up, of course, but by means other than plowing under crops susceptible to *Verticillium*. There is evidence that a high content of organic matter in the soil will help to keep down the amount of inoculum of the *Verticillium* fungus.

What to do if disease strikes

There is little that can be done once the tree is infected. Perhaps the most important measure is to maintain good cultural conditions for growth. This will encourage recovery of diseased trees, and may prevent symptom development on affected trees that have not developed wilt. Of course, it is important to maintain well balanced nutrition of the trees by proper fertilization.

It probably is not advisable to remove affected trees unless an individual tree has lost so many branches that it is misshapen. Sometimes wilted trees recover even though the wilt may be very severe. Furthermore, there is some danger of infection of any new trees that may be planted in the place of those lost because of *Verticillium* wilt. In this case, there would be no gain by replanting. If replanting is necessary, the chances of infection in the new trees will be reduced greatly by thorough removal of roots of diseased trees several months before replanting.

This Montmorency cherry tree has been infected for two or more years. The tree is severely defoliated throughout, and probably will die.





A healthy Montmorency cherry tree.

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